~~TITLE OF THE INVENTION~~EQUIPMENT AND PROCESS FOR MUSIC DIGITALIZATION, STORAGE, ACCESS AND LISTENING

Background of the invention

5 ~~BACKGROUND OF THE INVENTION~~

The applicant is the assignee of the US patent 6.437.229, filed on ~~11.17.00 and granted on 08.20.02,~~11.17. 2000 and issued on 08.20.2002, and it relates to an EQUIPMENT AND PROCESS FOR MUSIC DIGITALIZATION, STORAGE, ACCESS, AND LISTENING, which equipment and process are to be employed

10 in any commercial establishments trading CDs, in order to enable users to listen to all the ~~songs~~music tracks from all the CDs available at the store.

Said equipment and process are based on the digitizing of the ~~songs~~music tracks and their storage in a hard disk for later access and hearing.

As a rule, they provide for one or more digital music servers

15 (microcomputers where the ~~songs~~music tracks from digitized CDs shall be stored), one or more music digitizing stations (microcomputers in charge of digitizing one passage of each ~~song~~music track from each CD), and a number of listening stations (microcomputers through which the ~~songs digitized in~~music tracks stored in said servers may be accessed and listened by users). Each

20 listening station, provided with an earphone, a keyboard with display, and a bar code reader, communicates via local network with the~~se~~said servers. Each music CD is provided with a bar code tag that identifies it on an individual basis, ~~on~~in an ~~unmistakably~~unmistakable way.

The listening stations described in the abovementioned patent are relatively

25 costly due to the fact that each one comprises a personal computer (PC). Moreover, the apparatus described in this patent consists of a local system, in which the updating of the digital music server can only be made by means of the local digitizing station.

Patent document WO0209112 "Music listening system" describes a system

30 comprising music listening stations which enable customers to select, from a library of music tracks, stored in the station's large capacity memory means, the

tracks they wish to listen to, prior to deciding whether to make a purchase. These tracks are extracted from a distributable music storage means, such as an upload CD-ROM which also includes index means and a configuration file. Said distributable music storage means are produced in a host computer provided with

5 software that comprises a compression function, encryption function, indexing function, etc. Each listening station comprises: a CD-ROM drive; a hard disk drive; a microprocessor of the form used in personal computers (PC's); decoders comprising digital signal processor chips and a digital-to-analogue converter as well as two headsets for listening.

10 Among the shortcomings associated with the object of WO 0209112 is the high cost of each music listening station, due to the fact that it includes a CD drive, a hard disk drive and a PC-type microprocessor.

Additionally, the updating of the library of music tracks in each station — detailed in lines 8 and following, page 40 of said WO document — is a

15 cumbersome and time-consuming process, requiring the e-mailing of a request from the store operator to the host computer for an album/track listing, the creation of one or more upload CD-ROM's by the host computer operator and their delivery to the store for insertion in each listening station.

Furthermore, as described in line 23 and following, page 41, the deletion of

20 files from a listening post's memory requires the insertion of a "null" CD which has to be inserted in the CD-ROM drive, an action that has to be performed by an operator.

Objects of the invention

Accordingly, it is an object of the present invention to provide a music

25 listening arrangement in which the listening stations have a substantially smaller cost that in the known ones.

A further object is to provide a music listening arrangement in which the updating of the library of music tracks can be easily and speedily accomplished.

A further object is to provide a music listening arrangement in which the

30 digitizing station need not be directly connected to the digital music server.

A still further object of the invention is to allow the remote deletion and

insertion of music files.

Summary of the invention

In proceeding with its studies, the Applicant has now developed improvements to said equipment and process for music digitalization, storage,
5   access, and listening, which improvements are employed in the digital music server, the music digitizing station, and listening stations.

SUMMARY AND OBJECTS OF THE INVENTION

So, pursuant to these improvements, when the user desires to listen to
10   some songmusic tracks from a particular CD, the same shall havesaid user only have to pass the bar code of said CD byreader over the bar code reader in a listening station, by whichtag of said CD, allowing the speedy location of the information ofcomprising artist and title, and as well as the songmusic files of such CD, are quickly located. The first song. Said music file available is then sentis transmitted
15   through the local network to the listening station, which starts its reproduction (play) in the earphone. Following, using the keyboard and display, the user selects the desired track, and controls sound volume.

Likewise, pursuant to these improvements, the song file selected music file is downloaded in small blocks to the listening station, on demand of the latter,
20   which starts its reproduction (play) as soon as the first block is received. So, the user starts to listen the song in the earphone frommusic at the listening station, without having to wait for the whole file downloading. The listening station automatically requests the next song file block, in a manner that reproduction is not interrupted.

25   Likewise, pursuant to these improvements, the local server is provided with a control software that controls the listening stationsstation's entire operation through commands and messages determinedinterchanged between itsaid server and the listening stations, whichsaid control software embodiesembodying a function that allows certainselected listening stations, on a configurable basis, to
30   reproduce only particular CDs.

Another innovation introduced by these improvements consists in using one ~~central (or~~ remote) digital music server.

Besides, another innovation consists in using a "~~"~~download~~"~~" software that brings from ~~the central (or~~said remote) server~~,~~ the information ~~in~~concerning the

5   CD and its ~~song~~music files, as regards CDs not existing in the local server and that have been requested for listening at the listening stations. <u>This download software allows for automatic updating of the listening stations data files, contrasting to the time-consuming updating routine described in said WO 0209112.</u>

10   Pursuant to these improvements, the equipment is provided with a maintenance software for the local server, installed in the local server itself, and with a maintenance software for the ~~central (or~~ remote) server, installed in the digitizing station.

Formerly, the local server maintenance software was installed in the

15   digitizing station~~; then~~ <u>; in the present apparatus</u> said local server maintenance software ~~was~~has <u>been</u> transferred to the local server itself, because in the equipment hereby improved, the local server is a mandatory one, while the digitizing station is optional.

~~So~~Therefore, the maintenance software ~~executed~~installed in the ~~song~~music

20   digitizing station is the "~~central (or~~remote) server maintenance software~~"~~", and the maintenance software installed in the local server is the "~~"~~local server maintenance software~~"~~".

In fact, both the "~~"~~local server maintenance software~~"~~" and the "~~central (or~~ "remote) server maintenance software~~"~~" may be installed in the local server or in

25   the digitizing station; however, it is more ~~logic~~logical to install the "~~"~~local server maintenance software~~"~~" in the local server, ~~once it~~considering that there may exist a system without the digitizing station in the local network (notwithstanding the local server always exists), and the "~~central (or~~ "remote) server maintenance software~~"~~" in the digitizing station, ~~once~~since such station may play the role of the

30   station that carries out the digitizing and accesses the ~~central (or~~ remote) server for updating data related to digitized CDs.

The ~~central (or~~ remote) server maintenance software installed in the digitizing station has the function of providing maintenance in the table of CDs and ~~song~~music files of the ~~central (or remote)~~ server, in a manner ~~analog~~similar to that of the local server maintenance software ~~embodied~~installed in the local server

5   itself.

Likewise, pursuant to the improvements in question, the local server is provided with a software for updating the statistic data (statistic upload software), the function of which is to ~~input~~transmit the listening stations' usage statistic ~~data in~~information to the ~~central (or remote)~~ server.

10   Also pursuant to these improvements, the digitizing station is further provided with a data updating software (upload software), which enables the ~~central (or remote)~~ server to be updated with the information and ~~song~~music files of the ~~CDs~~digitized CDs and ~~recorded~~stored in the local server or in the digitizing station itself.

15   Based on ~~the~~a philosophy of simplicity and low cost ~~philosophy, this,~~ the present invention implements the listening station through an architecture substantially different from those in the existing systems in the market, where, among other important features, we may emphasize the local network interface embodied to the listening station.

20   Basically, the listening station ~~started to be~~is formed by dedicated ~~apparatuses using~~devices comprising a microcontroller, flash memory, components for audio decoding, digital/-to-analog conversion, serial and parallel communication~~,~~_ and network interface, among others. ~~By these means.~~Consequently, both the cost and physical size of the listening station have

25   been drastically reduced in comparison with the conventional implementation through compatible microcomputers and boards. In addition to that, the listening station ~~became~~becomes practically ~~immune~~independent from constant alterations ~~due to~~characteristic of the very dynamic and permanent evolution of ~~motherboard, processor and boards~~motherboards, processors and devices compatible with ~~the~~ PC

30   ~~microcomputer~~microcomputers.

Another advantage provided by the listening station of ~~this~~the present

invention is that it allows the ~~possibility of installing~~installation of a higher and better distributed number of listening stations throughout the ~~commercial establishment~~store, due to ~~its~~their smaller physical size and an easier installation procedure.

5   With all of those advantages, this invention enables users to listen to all ~~songs~~music tracks from all CDs available at the stores, in a ~~manner~~way that is substantially simpler, faster, and cheaper than the solutions normally employed for such a purpose.

10   ~~BRIEF DESCRIPTION OF THE DRAWINGS~~

Brief description of the drawings

A more complete appreciation of the present invention and many of the attendant advantages thereof will be readily understood by reference to the following detailed description when taken in conjunction with the accompanying

15   drawings, in which:

~~Figure~~ figure 1   is a block diagram, schematically illustrating the equipment/process components hereby innovated [(for illustration and description purposes only one ~~(1)~~music server **1** and one ~~(1)~~music digitizing station **2** are shown, but the system allows more than one ~~(1)~~music server **1** and more than one

20   ~~(1)~~music digitizing station, **2**, as well as it allows that only one microcomputer is the music server and the digitizing station at the same time]) ;

~~Figure~~ figure 2   illustrates the hardware block diagram of the listening station ;

~~Figure~~ figure 3   is a flow chart of the music digitizing station,

25   illustrating the sequence of operations for conducting music digitizing and storage at the music server hard disk;~~Figures~~

;figures 4   and 4A represent, on a continued basis, the music server flow chart ;

~~Figures~~ figures 5   and 5A represent, on a continued basis, the listening station flow chart, illustrating the sequence of operations for the user to access

30   and listen the desired ~~songs;~~music tracks;

~~Figure~~ figure 6   is a flow chart of the ~~central (or remote)~~ server

updating software (upload software), illustrating the basic sequence of operations for updating the ~~central (or remote)~~ server with CDs digitized and recorded in the local server or, eventually, in the digitizing station itself, in the event it is not in the local network environment of the listening stations and local server ; and

5   ~~Figure~~ figure 7   is a flow chart of the software (download software) that brings, from the ~~central (or remote)~~ server, the information ~~in the~~concerning any CD and its ~~song~~music files for CDs not ~~existing~~stored in the local server, and which have been requested for listening at the listening stations, or which are included in a list of CDs to be brought in a preset time, illustrating the basic

10 sequence of operations.

~~DETAILED DESCRIPTION OF THE INVENTION~~

Detailed Description of the Invention

The subject matter of ~~this Invention~~the present patent application relates to
15 an EQUIPMENT AND PROCESS FOR MUSIC DIGITALIZATION, STORAGE, ACCESS AND LISTENING, which ~~equipment, as contained in the~~constitutes an improvement of the apparatus described in US patent 6.437.229 of the same Applicant~~, and pursuant~~. Pursuant to the schematic illustration of the block diagram in figure 1, ~~is formed by~~it comprises a digital ~~music~~local server
20 ~~(1),~~1, one music digitizing station ~~(2),~~2, and a variable and convenient number of listening stations ~~(3),~~3, the latter being interlinked to the~~said~~ local server ~~(1)~~ and to the~~said~~ station ~~(2)~~ by a local network ~~(4),~~4, said digital ~~music~~local server ~~(1)~~ being a microcomputer provided with a high capacity hard disk ~~microcomputer~~ for storing the digitized ~~songs~~music tracks, and to centralize, in a database, all ~~of~~the
25 information ~~in~~concerning the digitized CDs.

The digitizing station ~~(2)~~ is a microcomputer provided with a CD-ROM reader and, as an option, with a bar code reader, destined for digitizing a passage (preferably the thirty initial seconds) from each track of an audio CD, converting it in a digital coded file, and recording it in the digital ~~music~~local server ~~(1),~~1.
30 Therefore, it is provided with a software that allows music control and

digitalization. For each digitized audio CD, a record with the CD information is made in said ~~local~~ server database ~~(1)~~. Eventually, in situations where the number of ~~CDs~~CD's to be digitized is very ~~big~~large, options for using more than one digitizing station may be developed.

5   Pursuant to these improvements, the ~~local~~ digital ~~music~~local server ~~(1)~~ is provided with a listening station control ~~program~~ (software) that controls the entire listening stations' operation by means of specific commands and messages ~~determined~~interchanged between it and the listening stations. So, such a software recognizes and accepts the connection request from each listening station, sends

10   initial configuration commands such as ~~"~~"remove cursor~~"~~", ~~"~~"clean display~~"~~", ~~"~~"light display up"~~, send~~, "enable input of bar code", sends the message ~~"~~"Read the bar code~~"~~", receives the bar code, accesses the database for obtaining information concerning the CD the bar code of which has been received, sends a command for adjusting the initial volume and, at the same time, for showing the

15   artist, track number, time elapsed and sound volume on the display, ~~sends~~transmits the ~~song~~music file in blocks, ~~so long it is requested~~in conformity to the requests sent by the listening station, sends the time elapsed ~~each second for it to be shown on~~in seconds for exhibition in the display, sends, from time to time and alternatively, to be shown ~~on~~in the display, the artist, title, CD number

20   (should there be more than one CD with the same bar code) and the price (if available). From that moment on, the local server software is ready to receive asynchronous messages from the listening station, which may be ~~"song "~~end"~~, time of track"~~, when it shall send the file corresponding to the next track (if it is not the last one), ~~"~~"next track key~~"~~", when it shall send the command for stopping the

25   current ~~song~~music reproduction (in the case it is reproducing any), and promptly upon send the file corresponding to the next track (which may be the first track, in the case it is already playing the last track of the CD), ~~"~~"previous track key~~"~~", when it shall send the command for stopping the current ~~song~~track (in the event it is reproducing any), and promptly ~~upon~~ send the file corresponding to the

30   previous track (which may be the last track if it is already playing CD first track), "stop key", when it shall send the command for stopping reproduction (if it is

reproducing any), "volume+ or volume- key", when it shall send a command for adjusting (increase or decrease) the volume and, at the same time, show the value of the new volume on the display, and ""read bar code", when it shall operate as ~~formerly~~previously described.

5   As another innovation, this local server control software ~~(1)~~ embodies a function that allows certain listening stations ~~(3)~~3, in a manner capable of configuration, to reproduce only particular CDs. The purpose of this function is to meet the need of certain stores to promote, together with recorders, certain CDs launches. In such a case, these listening stations ~~(3)~~ do not accept others CDs² bar 10   ~~code~~codes.

      Moreover, that local server ~~(1)~~ also ~~started to embody~~is provided with a local server maintenance ~~program (~~software~~)~~ that allows the exclusion of CDs or ~~songs~~music files corresponding to digitized tracks (said exclusion requiring the manual insertion of a "null" CD in the apparatus described in WO 0209112), the 15   updating of data related to the CDs in the database, the listing of digitized CDs, the generation of a summary of the changes made during a determined date period for enabling similar systems in other locations ~~be able~~to be updated, the updating of the local system through changes conducted in a system in other location, the listing of statistics of access to CDs by listening stations, so as to be possible to 20   know, for instance, which were the more accessed tracks or CDs within a time period, or to know which were the more used listening stations 3, and to obtain the automatic system updating through an autoexec CD-R containing input and output data from CDs and respective ~~song~~music files.

      Also pursuant to these improvements, a ~~central (or remote) digital music~~ 25   server ~~(1A)~~ is further provided (see ~~figure~~Fig. 1 again), which is ~~also~~ a microcomputer with a large capacity hard disk destined to store the digitized ~~songs~~CDs, and to centralize, in a database, all information ~~in~~about the digitized CDs. Said ~~central (or remote)~~ server ~~(1A)~~ may be accessed by local servers ~~(1)~~ and by digitizing stations ~~(2)~~,2, via WAN (wide area network) or via Internet ~~(4A)~~. 30   Another innovation introduced in the local server ~~(1) was~~ is the ~~embodiment~~provision of a download ~~program (~~software~~)~~, which brings from the

~~central (or remote)~~ server (1A) the information ~~in the~~regarding a CD and its

~~song~~music files, for CDs not ~~existing~~stored in the local server (1) and that have

been requested for listening at the listening stations (3). ~~That~~3. Said software also

enables the search, in said ~~central (or remote)~~ server (1A), ~~in~~at a preset time, of all

5   CDs, the bar codes of which are ~~enrolled~~compiled in a list available in the local

server (1).1.

~~Also as to the~~ A further innovation introduced in the local server (1), it1, is

~~provided with a program for updating statistic data (~~the provision of a statistic upload

software), the function of which is to ~~input~~transmit the statistic data of the

10   listening stations 3 usage (3), collected and stored in the local server (1), into1, to

the ~~central (or~~ remote) server (1A). ~~That~~Said software automatically sends the

statistic data to the ~~central (or~~ remote) server (1A) ~~in~~at a preset time, provided

that data already sent in previous times shall not be sent any longer and may be

~~discharged~~deleted from the local server (1).1. One advantage in having the statistic

15   data in the ~~central (or~~remote) server (1A) is that since all data are centralized, it is

easier to generate comparative reports involving more than one store.

So, in accordance with these improvements, the ~~central (or remote)~~ server

concept (1A) was included, the purpose of which is to be a repository for all

digitized CDs. It is, therefore, a central server that may be accessed by the local

20   servers (1) of the various stores, and also by digitizing stations (2),2, via WAN

(wide area network) or via Internet (4A), in order to bring to the stores the ~~CDs~~CD

files demanded by users, and also ~~to update~~enabling the ~~central~~updating of said

remote server 1A with the files of CDs digitized in the digitizing stations 2

located in the local network environment of stores ~~or their locations~~.

25   Moreover, pursuant to these improvements, the digitizing station (2) is

also provided with a program for updating the data (upload software), which

enables to update the ~~central (or remote)~~ server (1A) with the information and

~~song~~music files ~~in~~related to CDs digitized and recorded in the local server (1) or in

the ~~very~~ digitizing station (2) itself. That software allows the immediate updating,

30   as soon as a CD is digitized, or the updating ~~in~~at a preset time. It may also check

whether a CD is already present in the ~~central (or remote)~~ server (1A), and ~~by then,~~

such being the case, not carry out the updating, or to update regardless such a fact. So, the digitizing station (2) may be also used as a dedicated station, in order to input the new CDs launches into the central (or remote) server, and, by then, may be placed in a local network different from the local network where the listening
5   stations (3) and the local server (1) are.

A third program constitutes The software set of the digitizing station (2) suite of software: the central (or 2 also comprises the remote) server maintenance software. Such software has the function of providing maintenance in the table of CDs and songmusic files of the central (or remote) server (1A), in a manner
10   analogsimilar to the maintenance software embodiedresident in the local server (1).1.

Also pursuant to these improvements, and as illustrated in the block diagram shown in figure 2, the listening stations (3) are hardware and firmware apparatuses (microcontroller program) consisting of modules, the module A
15   consisting of an interface for keyboard/display (5),5, where the keyboard and the LCD display are connected, a serial interface (6),6, where the bar code reader (scanner) is connectedconnected, a microcontroller (7),7, which is the processing unit that executes the instructions of the firmware contained in the internal flash memory, a local network interface (8),8, where an Ethernet local network (4) is
20   connected, and a RAM (9) used by the firmware as a data area. The module B consists of a keyboard (11),11, a LCD (12),12, a bar code reader (scanner) (13),13, and an earphone (14),14, and constitutes an independent physical module because it is in direct contact with the user. The module C consists of the audio decoder, digital/-to-analog (D/A) converter, and the amplifying circuit for stereo audio
25   output; the earphone (14) of the module B is connected to this module C. And the module D is a power supply that provides the required voltages to modules A, B, and C, and has a power supply cable (10).10.

Unlikely of the Unlike a microcomputer, which requires an operationoperational system and drivers, further to the application *per se*, this
30   hardware apparatus requires, for it to operate, only a program (firmware) that controls the resources of the hardware, and which communicates with the

listening station control software installed in the local server program 1. The listening station firmware is responsible for requesting the TCP connection with the local server, receive receiving asynchronous messages from the bar code reader (CD bar code), from the keyboard ("next track", "previous track", "stop", "volume+" and "volume-"), and from the audio module ("song end"), and to send them to the local server program, receive and execute commands sent by the local server program, such as, comprising "remove cursor from the display", "clean the display", "light up the display", "enable the keyboard", "shown show the message on the display", "adjust the volume and show the message on the display", "store song music block and start reproduction", "store song block", "stop song music reproduction", etc.

    The final user has access only to the bar code reader, the keyboard, the display, and the earphone (Module A). The communication of the hardware apparatus with the bar code reader is made through serial ports RS-232C, RS-485, or USB, and with the keyboard by the keyboard interface. The sound is played in the earphone by module B, which contains the audio decoder, digital-to-analog converter, and output amplifier. The earphone can be of the conventional type usually found in the market, but it must be provided with a steel-coil protection for preventing steals stealing and vandalism attitudes. The bar code reader can may be a laser scanner with line scanning, or a CCD technology scanner, and the keyboard may be embodied as an apparatus with simple keys, provided with keys enough to allow the user to control track selection (forward and reward), the sound volume (increase and decrease) and also reproduction interruption. Eventually, the keyboard may have more keys allowing other functions.

    Local network bandwidth (4) should preferably be around 100 Mbps, taking into account the distance between the listening stations (3) and the local server (1) 1. In case of very long distances, complementary equipment may be required. The local network can be implemented by cables with conducting and connecting wires linking the involved equipment, or even by an electromagnetic wave communication means.

Figure 3 is a flow chart of the music digitizing station ~~(2),~~2, illustrating the sequence of operations for carrying out music digitizing and storage on local server's hard disk ~~(1),~~1, exactly as occurs in the former US patent 6.437.229, and described herein in order to help the understanding of the equipment and process
5 hereby improved.

Thus, the process starts by inserting an audio CD, in step E1, and all tracks are automatically selected for digitalization. In step E2, a number corresponding to the CD bar code is provided. In step E3, a decision is made as to whether additional information in the CD (artist and title) shall be included. If so, CD
10 additional information is input in the step E4.

Once such information is ~~input~~inputted to the system, or if no additional information is to be ~~input~~inputted, it goes to the next step E5, where the beginning and duration of the music passage to be digitized is specified. In step E6, the CD bar code number and, if any, additional information thereon, is entered into the
15 digital music local server ~~(1),~~1, starting the digitizing process for all tracks of the inserted CD.

In step E7, the digital reading of the first selected track is made, coding it in compacted form, recording it~~,~~ promptly ~~upon,~~ in the digital music local server ~~(1),~~1, the resulting file bearing the name formed by the bar code
20 number and the track number.

In step E8, a determination is made whether the last selected track has been digitized; if not, it returns to the step E7, reading the next selected track, its coding and recording ~~of~~ the file in the digital music local server ~~(1),~~1, That step E7 is repeated for every track of the CD, until the last track has been digitized.
25 When the answer for the step E8 is that the last track has been digitized, it goes to step E9, which determines whether the user ~~desire~~wishes or not to digitize another CD.

If yes, it returns to step E1. If not, the digitizing and storage process for a passage of all audio CD tracks is ~~accomplished~~terminated.

30 Figures 4 and 4A illustrate, one after the other, the flow chart of the listening station control software run by the local server ~~program~~, subject matter of

this~~the~~ present improvement. ~~illustrating the basic sequence of the operations carried out in the server for controlling a listening station.~~when executing an operation cycle that ~~includes from~~begins with the TCP connection request up to the activation of keyboard keys, including the sending of the bar code, database access, and

5   transmission of the ~~song~~music file.

In the initial step F1, it waits for the connection request from a listening station~~, when~~. When the request ~~comes~~is received, it accepts it (step F2), which makes connection between the ~~local~~ server and the listening station to be established. In step F3, it sends the configuration commands "~~"~~remove cursor"~~"~~,

10   "~~"~~clean display"~~"~~, "~~"~~enable keyboard"~~"~~ and "~~"~~light up display"~~"~~ to the listening station. Promptly upon, in step F4, it sends the command for showing the message "~~"~~Read the code bar"~~"~~ on the display enabling the reception of the bar code by the microcontroller. From that point, it waits for a bar code sent by the listening station (step ~~F~~step F5). When the bar code is received, it sends the

15   command to show the message "~~"~~Wait..."~~"~~ on the display (step F6).

In step F7, it checks whether the CD ~~the,~~ whose bar code ~~of which~~ was received, exists in the local server. Should ~~the CD the bar code of which was received~~such CD not exist in the local server, the message "~~"~~CD not registered ~~CD"~~"~~ is sent to ~~a~~the listening station (step F8), and, promptly upon, it checks

20   whether that CD should be searched in the ~~central (or remote)~~ server (step F9). If not, the flow returns to step F4, where the message "~~"~~Read the bar code"~~"~~ is sent. If yes, it checks if the CD should be immediately brought from the ~~central (or remote)~~ server (step F10). If the CD ~~has~~should not ~~to~~ be immediately brought, the information ~~in the~~concerning said CD is saved in a list of CDs to be brought by

25   the download software by~~in~~at a preset time (step F11), and the flow returns to step F4. If the CD ~~has~~is to be immediately brought, it sends ~~an advice~~a message, together with the required information, to the download software for it to search the CD in the ~~central (or remote)~~ server (step F12), after what the flow proceeds ~~into~~ step F4.

30   If the ~~CD the~~ bar code of ~~which~~the CD exists in the local server, the database is accessed (step F13) and all information associated to the bar code is

received.

Next, in step F14, it sends the command for adjusting the sound volume and to show, at the same time, the message formed by artist, track number, elapsed reproduction time and volume value on the display. In step F15, it ~~obtains~~extracts

5 the ~~song~~music file and ~~sends~~transmits its first block, together with a command for storing the first block ~~(with this block aggregated)~~and, at the same time, for starting ~~song~~music reproduction (play). In step F16, it waits for the message requesting the next block sent by the listening station. When such message is received, it checks whether there is a next ~~song~~music block to be sent (step F 17). If so, it

10 sends the block together with a command for storing ~~the aggregated song block~~it (step F18) and returns to step F16. If there is not any other block to be sent, it sends the command "~~"~~no more ~~song~~music blocks"~~"~~ (~~step F~~step F19) and proceeds ~~in step F~~to stepF20, where it waits for some asynchronous message from the listening station.

15   If an asynchronous message comes, it checks whether this message is the "~~"~~bar code"~~"~~ (step F21). If it is the bar code, it sends a command for stopping ~~song~~the music reproduction (step F22), and it ~~comes back~~returns to step F6. If it is not a bar code, it checks whether it is "~~"~~song end"~~"~~ (step F23). If it is "~~"~~song end"~~"~~, it returns to step F4. If it is not "~~"~~song end"~~"~~, it checks whether it is

20 "~~"~~stop"~~"~~ (step F24). If it is "~~"~~stop"~~"~~, it sends the command for stopping ~~song~~music reproduction (step F25), and returns to step F4. If it is not "~~"~~stop"~~"~~, it checks whether it is "~~"~~next track"~~"~~ or "~~"~~previous track"~~"~~ (step F26). If it is "~~"~~next track"~~"~~ or "~~"~~previous track"~~"~~, it sends a command for stopping ~~song~~music reproduction (step F27), and subsequently, in step F28, it sends a command for showing the

25 artist, the number of the track corresponding to the next track or previous track, the reproduction time elapsed and the volume value on the display, and it returns to the step F15. If it is not "~~"~~next track"~~"~~ or "~~"~~previous track"~~"~~, it checks whether it is "~~"~~volume+"~~"~~ or "~~"~~volume-"~~"~~ (step F29). If it is "~~"~~volume+"~~"~~ or "~~"~~volume-"~~"~~, it sends, in step F30, a command for adjusting the new volume value, increasing

30 (if it is "~~"~~volume+"~~"~~) or decreasing (if it is "~~"~~volume-"~~"~~) and, at the same time, to show such value on the display, proceeding the flow in step F31. If it is not

"volume+" or "volume-" (step F31), it checks whether the asynchronous message is a request for updating the elapsed reproduction time ~~elapsed~~. If yes, it sends a command for showing the updated elapsed time (~~which~~said value ~~is aggregated~~being appended to the command) on the display (step F32) and it
5   returns to step F20. If not, it directly returns to step F20.

Figures 5 and 5A illustrate, one after the other, the flow chart of the listening station program, which is also a subject of this improvement, illustrating the basic sequence of the operations ~~comprehended~~comprised in an operation cycle ~~that includes from~~starting with the TCP connection request, up to the activation of
10   the keyboard keys, including the transmission of the bar code ~~sending, song~~, reception of the music file ~~receipt~~, and ~~song~~music reproduction.

In the initial step (step ~~G1~~G1), a connection request is ~~made with~~sent to the local server. ~~In the next step (step G2), if~~If the connection is accepted (step G2), it goes to the next step (step G3), where it waits for a command from the local
15   server. If the command comes, it checks whether it is "stop", "remove cursor", "clean display", "enable keyboard", "light display up", "adjust the volume" or "show message" (step G4). If so, in step G5, it executes the command received; promptly upon, in step G6, it checks whether there is an asynchronous message to be sent to the local server; if
20   yes, it sends that message (step G7) and returns to step G3; if there is no asynchronous message, it returns to step G3.

If the received command is not one of ~~those aforementioned~~the above, if checks whether it is "send the bar code" (step G8). If it is "send the bar code", it checks, in step G9, whether there is a bar code to be sent~~; if~~. If any, it sends
25   (step G10) and returns to step G3. If not, it waits for a bar code (step G9).

If it is not "send bar code", it checks whether it is "store the first ~~song~~music block and start reproduction" (step ~~G11~~G11). If it is not, it checks whether it is "store ~~song~~music block" (step G12); if so, it executes the received command (step G13) and goes to step G16; if it is not "store the ~~song~~music
30   block", it checks whether the command is "no more ~~song~~music blocks" (step G14); if so, it goes to step G16, and if it is not, it returns to step G6. If the

received command is ~~"~~"store the first ~~song~~music block and start reproduction~~"~~", it
executes the received command (step G15), and follows to step G16, where it
checks whether there is an asynchronous message to be sent to the local server. If
there ~~is not an~~isn't any asynchronous message, it continues in step G16, waiting

5   for some asynchronous message. If there is an asynchronous message, it follows
to the next step (step G17), where it checks whether that message is ~~"~~"update the
elapsed reproduction time~~"~~". If so, it sends that message to the local server in step
G18, and waits for a command from the local server, in step G19. In that step, if a
command comes from the local server, it executes it in the next step (G20), after

10   which it returns to step G16. If the pending asynchronous message is not ~~"~~"update
the elapsed reproduction time~~"~~", it checks whether it is ~~"~~"volume+~~"~~" or ~~"~~"volume-
~~"~~" (step G21). If so, it sends the asynchronous message to the local server (step
G22) and waits for a command from the same (step G23). If the command comes
from the local server, it executes it (step G24) and returns to step G16. If the

15   asynchronous message is not ~~"~~"volume+~~"~~" nor ~~"~~"volume-~~"~~", it sends this message
to the local server (step G25) and returns to step G3.

        Figure 6 is a flow chart of the ~~central (or~~remote~~)~~ server updating program
(upload software), illustrating the basic sequence of operations for updating the
~~central (or remote)~~ server ~~(1~~A~~)~~ with CDs digitized and recorded in the local server

20   ~~(1)~~ or, eventually, in the digitizing station ~~(2)~~ itself, in the event it is not in the
local network environment of the listening stations and local server.

        In step H1, it checks whether there is any CD digitized in the local server
or in the digitizing station that should be sent to the ~~central (or~~remote~~)~~ server. If
any, the information in the CD and its ~~song~~music files are sent to the ~~central (or~~

25   remote~~)~~ server in step H2, after which it returns to step H1. If not, it verifies, in
step H3, whether the preset time was reached. If not, it returns to step ~~H1.~~H1. If
yes, it checks, in step H4, whether there is a CD in the list of CDs to be sent to the
~~central (or remote)~~ server ~~in~~at the preset time. If not, it returns to step H1. If yes, it
proceeds executing step H2.

30   Figure 7 is a flow chart of the program (download software) that brings,
from the ~~central (or~~remote~~)~~ server, the information in the CD and its ~~song~~music

files for CDs not ~~existing~~stored in the local server, and which have been requested for listening at the listening stations, or which are included in a list of CDs to be brought ~~in~~at a preset time, illustrating the basic sequence of operations.

In step ~~I1~~II, it checks whether there is a CD to be immediately brought from the ~~central (or remote)~~ server. If yes, it checks, in step I2, if the CD to be brought is ~~present~~stored in the ~~central (or remote)~~ server. If it is not ~~present~~stored, in step I3, the data ~~of~~related to the CD in the list of CDs to be brought ~~in~~at a preset time are saved, and it returns to step I1. If it is ~~present~~stored, in step I4,~~4~~ it brings the information ~~in~~related to the CD and its ~~song~~music files from the ~~central (or remote)~~ server, and the same are recorded in the local server~~; having it been done~~. Next, it returns to step I1. If, in step I1, there was not a CD to be immediately brought, it follows to step I5, where it checks whether the preset time was reached. If not, it turns to step I1. If yes, it checks, in step I6, whether there is a CD in the list of CDs to be brought from the ~~central (or remote)~~ server. If there is not, it returns to step I1. If any, it proceeds executing step I4.

While the invention has been described in its presently preferred form, it is to be understood that there are numerous applications and implementations for the present invention. ~~Accordingly, the invention is capable of modification and changes without departing from the spirit of the invention as set forth in the appended claims.~~